BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PRODUCTION OF FOAMED DECORATIVE MATERIAL

Patent Number: JP1110123
Publication date: 1989-04-26

Inventor(s): OKISHIO YUKIO
Applicant(s):: KYOWA LEATHER KK

Requested Patent: JP1110123
Application Number: JP19870267711 19871023
Priority Number(s):
IPC Classification: B29C59/04 ; B29C59/00 ; B29C69/00 ; B32B5/18 ; B32B33/00 ; C08J9/06
EC Classification:
Equivalents:

Abstract

PURPOSE:To produce various arbitrary patterns having repeat, by forming embossed patterns of repeat patterns by a chemical embossing method and applying sharp embossed patterns to the protruding parts of said patterns by a mechanical embossing method.
CONSTITUTION:A synthetic resin layer 2 containing a foaming agent is laminated to a base material 1 and a colored or uncolored printing pattern 3 having repeat patterns containing a foaming inhibitor or crosslinking agent is applied to said layer 2. Subsequently the synthetic resin layer 2 is foamed under heating to form a foamed layer 2' having embossed pattern of repeat patterns by a so called chemical embossing method for suppressing the foaming of the part of the printing pattern 3 to form the recessed parts of repeat patterns and developing the parts 5 having no printing pattern of repeat patterns to bring the same to protruding parts. Continuously, the foamed laminate is reheated to temp. equal to or less than the foaming processing temp. of the previous process and sharp random embossed patterns 5' are formed to the surface of the above mentioned protruding parts 5 by a clearance embossing method using a cold emboss roll having random embossed patterns carved in the surface thereof.

98923

Prodn. of foamed decorative material - comprises laminating synthetic resinous layer contg. foaming agent, onto substrate, coating with foaming inhibitor, heating, etc.

atent Assignee: KYOWA LEATHER CLOTH CO LTD (KYOG)

Number of Countries: 001

Number of Patents: 001

atent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
JP 1110123	A	19890426	JP 87267711	A	19871023		198923 B

riority Applications (No Type Date): JP 87267711 A 19871023

atent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
P 1110123	A		7			

bstract (Basic): **JP 1110123 A**

Prodn. comprises laminating a synthetic resinous layer contg. foaming agent onto a substrate, forming repeated print patterns of coatings contg. foaming inhibitor or crosslinking agent on the synthetic resinous layer, heating the resinous layer into a foamed layer having uneven patterns, re-heating the foamed layer lower than the foaming temp. and embossing the foamed layer with a cold embossing roll to form sharp and random uneven patterns at the convex surfaces thereof.

he substrate is pref.e.g. (fire retardant) paper, knit, (un)woven fabric, glass cloth, plastics sheet or these composite. The synthetic resinous layer is pref. of e.g. (co)polymer or polymer blend of vinyl chloride with e.g. vinyl acetate, ethylene, urethane. The foaming agent is e.g. azodicarbonamide, p,p'-oxybisbenzene sulphonyl hydrazide, azobisisobutyronitrile. The coating is of e.g. PVC, vinylchloride-celluloseacetate copolymer, acrylic resin, polyurethane.The foaming inhibitor is e.g. benzotriazole, organic acid (e.g. maleic acid, fumaric acid).

USE/ADVANTAGE - The material of e.g. internal trim, automotive trim, can have various stereoscopic and complex uneven patterns by changing chemical and mechanical embossing patterns, and is produced with low cost.

0/3

itle Terms: PRODUCE; FOAM; DECORATE; MATERIAL; COMPRISE; LAMINATE; SYNTHETIC; RESINOUS; LAYER; CONTAIN; FOAM; AGENT; SUBSTRATE; COATING; FOAM; INHIBIT; HEAT

erwent Class: A15; A32; P73

nternational Patent Class (Additional): B29C-059/04; B29C-069/00; B32B-005/18; B32B-033/00; C08J-009/06

File Segment: CPI; EngPI

nual Codes (CPI/A-N): A11-B05E; A11-C04A; A11-C04C; A12-S04A1; A12-T04B

asdoc Codes (KS): 0034 0037 0206 0218 0229 0239 0486 0759 0760 0787 1294 1977 2273 3219 3220 2324 2437 2443 2479 3240 2496 2522 2528 2536 2723 2724 2725 2726 2820 2821 3300 2829

olymer Fragment Codes (PF):

⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　平1-110123

⑤1Int.Cl.⁴	識別記号	庁内整理番号	⑬公開　平成1年(1989)4月26日
B 29 C 59/04		Z-7639-4F	
59/00		A-7639-4F	
69/00		6363-4F	
B 32 B 5/18		7016-4F	
33/00		6122-4F	
C 08 J 9/06		8517-4F	審査請求　未請求　発明の数 1　(全7頁)

⑤4発明の名称　発泡装飾材の製造方法

⑳特　願　昭62-267711

㉒出　願　昭62(1987)10月23日

㉑発明者　沖汐　行雄　静岡県浜松市東町1876番地　共和レザー株式会社内

㉑出願人　共和レザー株式会社　静岡県浜松市東町1876番地

㉔代理人　弁理士　市川　理吉

明　細　書

1. 発明の名称

発泡装飾材の製造方法

2. 特許請求の範囲

基材上に発泡剤を含有した合成樹脂層を積層した後、該層表面に発泡制御剤もしくは架橋剤を混入した塗料を用いてリピート柄を有する印刷模様を施し、これを加熱発泡して凹凸模様を有する発泡層とし、次いで上記発泡層形成時の発泡温度以下の温度を用いて該層を再加熱し、続いて冷エンボスロールにより該層の上記凸模様の形成部分に更にシャープな形状の凹凸のランダム状模様を付形することを特徴とする発泡装飾材の製造方法。

3. 発明の詳細な説明

〔産業上の利用分野〕

本発明は発泡層表面にリピート柄を有する凹模様を施し更に該層の凸模様部にシャープな凹凸模様を形成することにより複雑な立体感に富んだ凹凸模様を有する意匠性に優れた室内発泡装飾材の製造方法に関するものである。

〔従来の技術〕

近来車両用、建築用の内装材は高級志向性の高まりに伴い次第に複雑なパターン柄の要望が強くなり、その具現性の一環として、基材上に積層した合成樹脂発泡体の表面にリピートを有する柄模様を形成した凹部分と、該層凸部に更にランダム状のシャープな凹凸模様を付与することにより複雑で立体的な高意匠性の内装材の開発が要望されている。

従来かかるパターンを有する内装材を製造する方法としては(1)発泡剤を含有した合成樹脂層を加熱発泡し、その直後に該層表面に冷エンボスロールを用いてランダム状の凹凸絞模様を形成し次いでこれを加熱してリピート柄の冷絞ロールにより凹絞模様を付与するいわゆる二次

エンボス加工方法、又は(2)発泡剤を含有した合成樹脂層の表面に発泡抑制剤又は架橋剤を添加した塗料を用いて上記の凹部及び凸部に対応する柄模様を印刷した後、これを加熱発泡して上記の凹凸模様に相当したパターンを形成するケミカルエンボス方法が知られている。

〔本発明が解決しようとする問題点〕

しかしながら、上記(1)の方法では第２次絞押時の加熱のため先に形成した一次エンボスの絞模様が変形し、又一次、二次の絞押のため２回の加熱を上記発泡層が受けるため繰返加熱による発泡層自体のへたり，セル荒れ等の変形及び熱劣化現象を起し好ましくない。

また、高価なエンボスロール２本が必要となり、コスト高で経済的でなく、かつ該ロールのパターンは上記理由により相当な差を有する柄深度のものが必要となり、一定深度と形状の安定した絞模様を付与することが困難であるという

は架橋剤を混入した塗料を用いてリピート柄を有する印刷模様を施し、これを加熱発泡して凹凸模様を有する発泡層とし、次いで上記発泡層形成時の発泡温度以下の温度を用いて該層を再加熱し、続いて冷エンボスロールにより該層の上記の凸模様形成部分に更にシャープな形状の凹凸のランダム状模様を付形する発泡装飾材の製造方法である。

〔作　　用〕

以下本発明の製造方法について詳細に説明する。

本発明においては先づ基材に発泡剤を含有した合成樹脂層を形成する。その方法としてはカレンダー法，コーティング法又は押出法のいずれかの方法を用いて該含有発泡剤の分解温度以下の加工条件でそのシート厚が0.05～0.3㎜好ましくは0.10～0.25㎜になる様積層する。これは該シートを加熱し発泡層を形成し前述の凹

う諸欠点を有する。又(2)の方法では一応上記(1)の欠点は排除することが出来るが、使用する抑制剤又は架橋剤が印刷表面より下部へのみ浸透することが困難で、その周囲にも拡散する傾向があるため、柄際の凹凸が不鮮明となり又凹凸模様を形成する発泡時の温度，時間のコントロールがむづかしく、このため鮮明で凹凸差が大きく、かつ繊細な柄際を有するパターンを形成することが出来ないという欠点を有する。

本発明は前述従来のような諸問題を解決すべく鋭意研究の結果、ケミカルエンボス法とメカニカルエンボス法を組合せ使用することによりリピート柄を有する凹部と更に上記凸部分にシャープで複雑なランダム状模様を有する発泡装飾材の製造方法を提供するものである。

〔問題点を解決するための手段〕

本発明は基材上に発泡剤を含有した合成樹脂層を積層した後、該層表面に発泡抑制剤もしく

凸模様を付形する場合0.05㎜以下では薄すぎるため肉厚が不足し本発明の目的とする凹凸模様を付形することが出来ず、又0.25㎜以上では前記凹凸模様の形成には満足するものとなるが、重量的に重くなりすぎ内装材としての施工性に問題が生じ、又特に壁装用内装材として用いる場合該材に適用されている防燃規格上の重量規制をクリアー出来ず、又製品コスト的にも高価となり好ましくない。

また、本発明に用いる上記基材としては、一般に壁，車輌用内装材に用いられている紙，難燃紙，織布，編布，不織布，ガラスクロス，プラスチックシート等を単独又はこれらの２種以上の積層物であり、又該基材上に積層する発泡剤を含有した合成樹脂層に用いる合成樹脂としては塩化ビニルのホモポリマー以外に塩化ビニルとポリ酢酸ビニル，ポリエチレン，ポリウレタン等の共重合体又は塩化ビニルのホモポリ

マーとこれらの混合物であり、これに発泡剤としてアゾジカルボン酸アミド，PP－オキシビスベンゼンスルホニルヒドラジッド，アゾビスイソブチロニトリル等の汎用の加熱分解型の発泡剤と可塑剤，安定剤，滑剤，キレーター，充填剤，着色剤等を混入して使用する。次いで上記積層シートの表面に発泡抑制剤もしくは架橋剤を混入した着色又は無着色の塗料を用いてリピート柄を有する印刷模様を形成する。上記の印刷模様としてはリピートを有する柄模様であればいかなるパターンのものでも良く、格子柄，花柄，幾何学柄等意匠性の高いものを随意に選んで用いれば良い。

該塗料に用いる樹脂としては、ポリ塩化ビニル又は塩化ビニルと酢酸ビニルとの共重合体，アクリル樹脂，ポリウレタン，酢酸セルロース等を用いこれに溶剤としてメチルエチルケトン，シクロヘキサノン，メチルイソブチルケン

ト等のケトン類，トルエン，キシレン等の芳香族炭化水素，エチレンジクロライド，メチレンクロライド等の塩素化炭化水素等使用樹脂の種類により適宜選択し混合して使用する。又該塗料が着色塗料である場合には耐候性，耐熱性に優れた種類の顔料を選択して用い、製品に上記物性に秀で耐久性を保有せしめる。又本塗料に混入する発泡抑制剤としてはベンゾトリアゾール，有機酸（例えばマレイン酸，フマル酸，アジピン酸），ハロゲン化有機酸（例えば塩化ガレフタロイル，無水テトラクロロフタル酸），又は有機酸無水物（例えば無水マレイン酸，無水トリメリット酸）等を用いることが出来るが、ベンゾトリアゾール又は無水トリメリット酸を用いることが特に好ましい。又該塗料に混入する架橋剤としてはジチオールーSートリアジン誘導体（例えば2－ジブチルアミノ，2－ジメチルアミノ，2－オクチルアミノー等の

Sートリアジン誘導体）を用いること、特に2－ジブチルアミノーSートリアジン誘導体を用いることが本発明では好ましい。上記の発泡抑制剤もしくは架橋剤の該塗料に於ける混入量としては塗料全重量に対して2～30重量％で、好ましくは5～20重量％であり、該発泡抑制剤もしくは架橋剤の混入量が2％以下では該塗料を用いた印刷模様付与部分の上記積層シート層の発泡時の発泡抑制もしくは架橋効果が不充分となり本発明の目的とするリピート柄を有する充分な形状の凹部が得られず又30重量％以上混入しても該発泡抑制もしくは架橋効果は向上しない。又本発明では上記発泡抑制剤もしくは架橋剤を混入しない上記組成の着色一般塗料を用いて前記柄模様と異なったパターンを有する着色柄模様を前記積層シート上に更に併施工することにより、より複雑で高意匠効果の製品とすることが出来る。後者の印刷模様の形成は該積

層シートの後工程である発泡層形成後施しても良い。上記印刷模様を施す方法としては一般に用いられているグラビア印刷法，ロータリースクリーン印刷法，フレキソ印刷法等を用いる。

次いで該層の含有発泡剤の分解温度以下の温度を用いて加熱乾燥せしめた後、該合成樹脂層を加熱炉により加熱発泡せしめるとともに、上記の発泡抑制剤もしくは架橋剤を混入した塗料を用いて柄模様を施した印刷部分の発泡を抑制し、凹状のリピートパターンを有する凹凸発泡層に形成する。

該層の形成は、その発泡部分即ち凸模様部の発泡倍率を2～8倍とすることが肝要である。該発泡倍率が2倍（発泡シート厚で0.1～0.6㎜）以下では発泡層が薄すぎるため、上記のリピート柄を有する凹部パターンの形成並びに次工程の冷却エンボスロールによる発泡層凸模様部に対するランダム状エンボス凹凸模様がシャープ

で立体的な形状に形成されず好ましくない。また、8倍（発泡シート厚で0.4～2.4㎜）以上では前者のリピート柄を有する凹部の形成は満足せしめることができるが、発泡倍率が高過ぎるため後者のランダム状の凹凸模様がシャープに形成されず、本発明の目的の形状の製品を得ることができず、また過発泡のため該層表面の荒れを生じ、製品の表面強度が弱くなり好ましくない。

かくして、ケミカルエンボス法により上記発泡層にリピート柄を有する凹凸模様を付与した後これを遠赤外ヒーター，熱風炉等の一般に用いられている加熱装置を使用して、該層を前記発泡加熱温度以下(含有発泡剤の分解温度以下)の温度で再加熱し、凹凸模様を有する冷エンボスロールを用いて、上記の凹凸模様の凸部にランダム状のシャープな凹凸模様を形成する。

この場合前記の発泡倍率が約8倍に近い発泡

した合成樹脂層2を積層し、次いで該層表面に発泡抑制剤もしくは架橋剤を混入したリピート柄を有する着色又は非着色の印刷模様3を施したものである。

次いで上記の発泡剤を含有した合成樹脂層2を加熱発泡して第2図に示す如く印刷模様3の部分の発泡が抑制されてリピート柄の凹部6となり、また該リピート柄の印刷模様のない部分5は発泡して凸部となる所謂ケミカルエンボス法によりリピート柄の凹凸模様を有する発泡層2'を形成し、続いてこれを前工程の発泡加工温度（含有発泡剤の分解温度）以下の温度で再加熱しその表面よりランダム状の凹凸模様を彫刻した冷エンボスロールを用いてクリヤランスエンボス法により上記の凸部5の表面に第3図に示す如くシャープなランダム状の凹凸模様5'を形成する。又本発明では上記の発泡工程前又は発泡工程後の絞押加工前に通常一般に用いられ

層に対しては該ロールの凹凸深度が約0.8～2.0㎜，低発泡の約2倍の発泡倍率のものには該ロール深度が0.3～0.8㎜のロールを用いてクリヤランスエンボス加工法により付形することが望ましい。これは上記の発泡層の凸部分の発泡セル構造を圧潰せずにランダム状のシャープで立体的な形状の凹凸模様を付与するためである。又本発明においては必要に応じて上記発泡層表面にその発泡前もしくは発泡後に一般に用いられているポリ塩化ビニル系樹脂，アクリル系樹脂，ウレタン系樹脂その他の樹脂の単独もしくはこれ等の共重合体又は混合物よりなる表面処理剤を用いて、表面処理層を形成する。かくすることにより製品の耐汚染性，ツヤ消等の効果を付与することができる。

〔実　施　例〕

第1図は本発明の一実施例の発泡前の状態を示したものであるが、基材1上に発泡剤を含有

ている印刷塗料を用いて上記合成樹脂層2又は発泡層2'のリピート凹凸模様の凸部5の表面に印刷模様4を付与することより更に高意匠性の製品とすることも出来る。又各図面には図示されていないが、本発明には場合により該合成樹脂発泡層の表面に一般に用いられている表面処理層を形成することにより更に耐汚染性とツヤ消効果を付与することが出来る。

〔実施例1〕

壁紙裏打用難燃紙（林興人社製ＷＫ－70NTP）上に発泡剤を含有した下記配合Ａの塗料をコンマコーターを用いて厚さが約0.2㎜になる様に塗布した後、熱風乾燥炉を使用して前記発泡剤の分解温度以下の約140℃の温度で約2分間加熱してこれをゲル化乾燥せしめて発泡剤を含有した着色合成樹脂層を形成し、その表面に下記配合Ｂの発泡抑制剤を混入した着色インキを用いグラビア印刷法により格子柄のリピート

を有する印刷模様を付与し約110℃の温度で約40°秒間熱風乾燥した後、通常のグラビアインキを用いて上記の印刷模様とリピートを異にした格子柄を同じくグラビア印刷法により付形しこれを上記の印刷模様と同様にして乾燥し、次いでこれを発泡炉を用いて約220℃の温度で約60秒間加熱し、上記の含有発泡剤を分解して前記合成樹脂層を発泡せしめるとともに上記発泡抑制剤を含有した印刷部分の発泡を抑制し凹状の着色格子柄模様を有するタイル調の発泡体を得た。次に該発泡体の表面を遠赤外線ヒーターを用いて前記の発泡温度以下の温度で再加熱し、石目調のランダム状の模様を凹凸深度約1.5㎜に彫刻した冷エンボスロールを用いてクリヤランスエンボス加工法により前記タイル調の発泡体の凸部に鉸押加工を施し、格子柄のリピートを有する凹部パターンと凸部に石目調のシャープなランダム状の凹凸パターンとを複

成した後、カレンダー法により下記配合Cの発泡剤含有組成物をシート厚が約0.18㎜になる様に積層し、次いで該層表面に下記配合Dの架橋剤を混入した着色インキを用いてリピートを有する花柄模様を実施例1と同様の方法を用いて形成し、これを発泡炉により約210℃の温度で90秒間加熱して発泡せしめて、該柄の凸部分厚さが0.9㎜、凹部分の厚みが約0.4㎜の凹凸の発泡体を得た。次いでこれを実施例1と同様にクリヤランスエンボス方法を用いて、ランダム状の布目調の模様を凹凸深度約0.8㎜に彫刻した冷エンボスロールを使用して凹凸模様を付形し、花柄の凹凸模様を有し、しかも該花柄模様の凸部分に布目模様が表現された実施例1と同様の顕著な凹凸形状と意匠に優れた車両内装用発泡装飾材を得た。

合した高意匠性を有するとともに顕著な立体感を具現した建材内装用発泡装飾材を得た。

配　合　A

塩化ビニル樹脂〔P-900ペースト用樹脂〕	100重量部
DOP	50 〃
TCP	15 〃
Ba-Zn 安定剤	3 〃
発泡剤（ADCA）	6 〃
充填剤（$CaCO_3$）	50 〃
チタン顔料	15 〃

配　合　B

塩化ビニル－酢酸ビニル共重合体樹脂	20重量部
メチルエチルケトン	90 〃
メチルイソブチルケトン	30 〃
無水メリット酸（発泡抑制剤）	30 〃
弁柄顔料	10 〃
チタンイエロー顔料	30 〃
カーボンブラック	2 〃

〔実施例2〕

目付90g／㎡のポリエステル繊維不織布を基材としこれに一般の塩化ビニルレザーに用いられている下引塗料をコーティングし接合層を形

配　合　C

PVC〔P-1100ストレート樹脂〕	100重量部
DOP	45 〃
TCP	15 〃
Ba-Ca-Zn安定剤	3 〃
発泡剤（ADCA）	3 〃
充填剤（$CaCO_3$）	20 〃
チタン顔料	10 〃

配　合　D

塩化ビニル－酢酸ビニル共重合体樹脂	20重量部
メチルエチルケトン	120 〃
トルエン	40 〃
トリアジン－チオールDB（三協化成㈱製　架橋剤）	25 〃
弁柄顔料	15 〃
チタンイエロー顔料	25 〃
カーボンブラック	2 〃

〔効　　果〕

以上の如く本発明は基材に発泡剤を含有した合成樹脂層を積層し、該層上に発泡抑制剤もしくは架橋剤を混入した塗料を用いていわゆるケミカルエンボス法によりリピート柄の凹凸模様を形成し、該凸部にランダム状模様を彫刻した

エンボスロールを用いるいわゆるメカニカルエンボス法によりシャープな凹凸模様を施すため、従来製造し得なかった顕著な立体感と復雑な高意匠性の内装用発泡装飾材の製造を可能とするばかりでなく、前記ケミカルエンボス法を用いることにより高価なエンボスロールを各柄に応じて製造する弊害を排除することが可能となり、リピートを有する多種多様の柄模様を任意に選択し安価に製造することができ、またさらに、該柄と後者の少数のランダム模様との組合せからなるパターンの模様によって極めて凹凸の立体感に富んだ高意匠性の発泡装飾用内装材を得ることができる。

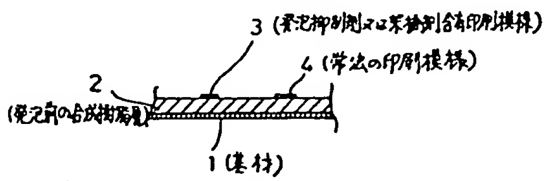
4. 図面の簡単な説明

第１図は本発明の一実施例の発泡前の断面図、第２図は、その発泡後の断面図、第３図は第２図にさらにエンボス模様を付形した断面図である。

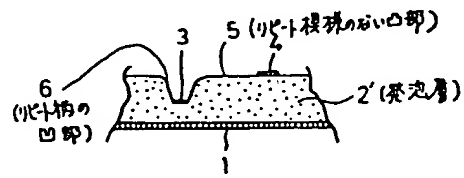
１：基材、２：発泡前の合成樹脂層、２″：発泡層、３：発泡抑制剤又は架橋剤含有印刷模様、４：常法の印刷模様、５：リピート模様のない凸部、５′：ランダム状凹凸模様、６：リピート柄の凹部。

特許出願人
共和レザー株式会社
代理人
市川理吉

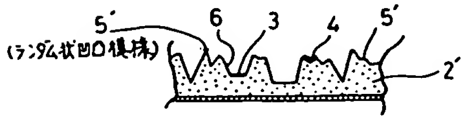
第１図



第２図



第３図



手続補正書（自発）

昭和６２年１２月　４日

特許庁長官　小川邦夫殿

1　事件の表示

昭和６２年特許願第２６７７１１号

2　発明の名称

発泡装飾材の製造方法

3　補正をする者

特許出願人

共和レザー株式会社

4　代理人

東京都中央区京橋三丁目１番２号片倉ビル

（８１７９）弁理士　市川理吉

5　補正の対象

明細書中「特許請求の範囲」および「発明の詳細な説明」の各欄

6　補正の内容

(1)　明細書中「特許請求の範囲」を［別紙

1

の通り訂正する。

(2) 同書第3頁11行目「繰返加熱」を「繰返し加熱」と訂正する。

(3) 同書第3頁13行目「起し」を「起こし」と訂正する。

(4) 同書第5頁最下行「加熱し」を「加熱して」と訂正する。

(5) 同書第6頁3行目「0.25mm」を「0.3mm」と訂正する。

(6) 同書第7頁最下行～8頁1行「メチルイソブチルケント等の」を「メチルイソブチルケトン等の」と訂正する。

(7) 同書第8頁8～9行「ベソゾトリアゾール、」を「ベンゾトリアゾール、」と訂正する。

(8) 同書第16頁中「配合B」の表を［別紙2］の通り訂正する。

以　上

2

［別紙2］

「

配　合　B

塩化ビニル－酢酸ビニル共重合体樹脂	20重量部
メチルエチルケトン	90重量部
メチルイソブチルケトン	30重量部
無水トリメリット酸（発泡抑制剤）	30重量部
弁柄顔料	10重量部
チタンイエロー顔料	30重量部
カーボインブラック	2重量部

」

［別紙1］

「　特許請求の範囲

基材上に発泡剤を含有した合成樹脂層を積層した後、該層表面に発泡抑制剤もしくは架橋剤を混入した塗料を用いてリピート柄を有する印刷模様を施し、これを加熱発泡して凹凸模様を有する発泡層とし、次いで上記発泡層形成時の発泡温度以下の温度を用いて該層を再加熱し、続いて冷エンボスロールにより該層の上記凸模様の形成部分に更にシャープな形状の凹凸のランダム状模様を付形することを特徴とする発泡装飾材の製造方法。」

Japan Patent Office (JP)
Public Application
Official Gazette (A)
Issue # Hei 1-110123
Publication Date: April 26, 1989
Of Invention: 1
(Page Total: 7)

Name of Invention: Manufacturing Method of Forming Decoration Material

Application #: Sho 62-267711
Application Date: October 23, 1987

Name of Inventor: Yukio Okishio, Kyowa Leather, Inc., 1876 Higasimachi, Hamamatsu-Shi, Sizuoka Prefecture
Name of Applicant: Kyowa Leather, Inc., 1876 Higasimachi, Hamamatsu-Shi, Sizuoka Prefecture
Name of Proxy: Rikichi Ichikawa, Patent Agent

Detailed Statement

1. Name of Invention

Manufacturing Method of Forming Decoration Material

2. Scope of Patent Application

Manufacturing method of forming decoration material that characterizes the following: after layering synthetic resin that contains forming agent on a base material, print a repeating pattern using a paint containing a forming control agent or a bridging agent, heat-form the forming layer containing a concave-convex pattern, and then reheat the layer with the temperature lower than the above forming layer formation temperature, then print a sharper random

concave-convex pattern on the convex part of the layer using a cold emboss roll.

3. Detained Explanation of the Invention

[Utilization Fields in the Industry]

This is the invention concerning the manufacturing method of indoor forming decoration materials that has a complex and three-dimensional concave-convex pattern that is realized by printing concave pattern with a repeating pattern on the forming layer surface, then printing a sharp concave-convex pattern on the convex part of the layer.

[Existing Technology]

These days the needs for interior decoration materials for car and construction with complex patterns have heightened due to the rise of high-quality tastes. In order to meet those needs, development of complex and three-dimensional interior decoration materials that have the concave part with a repeating pattern on the surface of a forming agent layered synthetic leather resin on a base material, and with a random sharp concave-convex pattern on the convex part of the layer is demanded.

Known existing methods for producing interior decoration materials with such patterns are:

(1) Second Emboss Processing Method – heat-form a synthetic leather resin layer containing a forming agent, immediately after the formation print a random concave-convex pattern on the surface of the layer using a cold emboss roll, then heat it to add a concave pattern using a repeating patterned cold pattern roll.

(2) Chemical Emboss Method – after printing a pattern corresponding to the above concave and convex parts using paint with a forming control agent or a bridging agent on the surface of the synthetic leather resin layer containing a forming agent, heat-form the same concave-convex pattern,

[Problems that this invention solves]

Method (1) deforms the first emboss pattern due to the added heat of the second emboss process, and the forming layer gets worn out and cells deteriorated due to the two heating processes.

Also, two expensive emboss rolls are needed that is not economical, and due to the above reasons the patterns on the rolls must be far different from each other, and it is difficult to add stable patterns with the fixed depth and shape.

Method (2) eliminates the above problems, but it is difficult for a control agent or a bridging agent to penetrate below the printing surface, and due to the tendency to spread to the surroundings a concave-convex pattern becomes unclear, also due to the difficulty of controlling the temperature and the time to print the pattern it is not possible to print a clear, delicate and intense concave-convex pattern.

After the intensive research to solve the above problems, a forming decoration material manufacturing method to have a repeating pattern on the concave part and a sharp and complex random pattern on the above convex part is invented by combining the chemical emboss method and the mechanical emboss method.

[Means to Solve the Problems]

Manufacturing method of forming decoration materials that characterizes the following: after layering synthetic resin that contains a forming agent on the base material, print a repeating pattern using a paint containing a forming control agent or a bridging agent, heat-form the forming layer containing a concave-convex pattern, and then reheat the layer with the temperature lower than the above forming layer formation temperature, then print a sharper random concave-convex pattern on the convex part of the layer using a cold emboss roll.

[Effects]

Below explains in detail the manufacturing method of this invention.

First, form a synthetic leather resin layer containing a forming agent as the base material. To do this, use the calendar method, coating method or press-out method, coat the layer with below decomposition temperature of the containing forming agent, and make the thickness of the sheet to 0.05~0.3mm, desirably 0.10~0.25mm. This is not preferable because when heating the sheet to form a forming layer, the concave-convex pattern this invention aims to achieve cannot be formed if the thickness is below 0.05mm. Said concave-convex pattern can be formed if the thickness is above 0.25mm, but it would be too heavy as an interior decoration material. Also if used as interior wall decoration material it cannot clear the weight regulation of the fire-resistance standards, and the cost would be too high.

The base materials used for this invention are paper commonly used for car and construction, glass sheet, plastic sheet etc., and one or more of those are used to coat the layer. The synthetic resins used to form a synthetic resin layer on the base material containing a forming agent are: heat-decomposition type forming agents and reverse agents such as vinyl chloride homo-polymer, vinyl chloride and polymer acetic acid vinyl, polyethylene, polyurethane, vinyl chloride mixtures. Also the followings are mixed as a forming agent: azobecarbon acid amide, PP oxibis-benzen-surhonil-hidradit, azobes-isop-thylonitril, stabilizer, lubricant, quilator,, filler, coloring. Then print a pattern containing a repeating pattern using a color or colorless paint mixed with a forming control agent or a bridging agent on the surface of the layer sheet. Regarding the above print pattern, it can be any if it contains a repeating pattern such as cross-stripe pattern, flower pattern and geometric pattern.

Regarding the resins used for the paint, depending on the type of resin used choose and mix the following: polyvinyl chloride or copolymer of vinyl chloride and acetic acid vinyl, acrylic acid resin, polyurethane, acetic acid cellulose, and the solvents used are: methyl-ethyl cetron, cyclohexanon, ceton

compounds such as methyl-isopthyl-ceton, aromatic hydrocarbon compounds such as tornin and cethlen, chloric hydrocarbon compounds such as ethylene-chloride and ethylene-chloride. If the paint has color, choose one with high heat-resistant pigments to get high durability. Regarding the forming control agents mixed with the paint, benzotriazole or anhydrous trimerit acid are preferably used, but the following can be used as well: organic acid (mylen acid, fummal acid, athypine acid), halogen organic acid (galephtaroyl chloride, anhydrous trimerit acid), organic acid anhydride. Regarding the bridging agents mixed with the paint, 2-dibethyl amide-S-triadin derivative is preferably used, but the following can be used as well: dithyol-S-triadin derivative (S-triadin derivatives such as 2-dibethyl amide, 2-dimethyl amide, 2-octethyl amide). Preferred amount of a forming control agent or a bridging agent to mix into the paint is 5~20% of the total weight, and can also be 2~30%. If the mixing amount of a forming control agent or a bridging agent is less than 2%, forming control effect or bridging effect won't be sufficient at the pattern printed parts of the layer sheet and won't be able to get the repeating pattern at the concave part this invention aims to achieve, and mixing more than 30% won't improve the forming control effect or bridging effect. Also by co-processing using a paint without the above forming or bridging agent and forming different patterns on the layer sheet, even more complex patterns can be produced. This can also be done after forming layer is produced on the layer sheet. The ordinary printing methods such as photogravure printing, rotary screen printing, flexo printing are used for this process.

After heat-drying the synthetic resin layer with the temperature below the forming agent's decomposition point, heat-form it in the heating furnace, control the formation at the printing part using a paint with a forming control agent or a bridging agent, printing a concave-convex forming layer with a repeating pattern on the convex part.

It is important for the magnification of the formation to be 2~8 times to form the layer. It is not preferable to be less than 2 times (forming sheet thickness of

0.1~0.6mm) because that makes the forming layer too thin, and either a repeating pattern at the convex part nor a sharp three-dimensional random emboss concave-convex pattern at the concave part using the cold emboss roll are achieved. If more than 8 times (forming sheet thickness of 0.4~2.4mm), a repeating pattern at the convex part is achieved, but the high magnification won't make the random concave-convex pattern sharp enough. It also makes rough surface and weak surface strength.

Thus, by using the chemical emboss method to print a concave-convex pattern with a repeating pattern on the forming layer and reheat it with the temperature below the point that heat-formed the layer (below the decomposition point of the forming agent) using the regular heating system such as infrared heater or hot blast stove, print a random and sharp concave-convex pattern at the convex part using a cold emboss roll with a concave-convex pattern.

It is preferable to have a false roll concave-convex depth of 0.8~2.0mm for the forming layer with about 8 times of the forming magnification, 0.3~0.8mm with 2 times. This is to print a random and sharp three-dimensional concave-convex pattern without crushing the forming cell structure at the convex part of the forming layer. If necessary, before or after the formation, form a surface treatment layer on the forming layer surface using a surface treatment agent made of one of or mixture of the following: polyvinyl chloride resin, acrylic acid resin, urethane resin and others. This way pollution resistance and matte effect can be achieved.

[Examples]

Figure 1 indicates one example of the condition before forming. First, layer a synthetic resin (2) on a base layer (1), then print color or colorless pattern containing a repeating pattern with a forming agent or a bridging agent (3) on the layer surface.

When heat-forming the synthetic resin layer containing a forming agent (2), the forming at the printing pattern (3) is controlled as indicated in figure 2, making

the convex part with a repeating pattern (6). The part without a repeating printing pattern (5) forms a layer with a repeating concave-convex pattern at the convex part (2) using a chemical emboss method. Then by re-heating it with the temperature below the forming process point in the previous process (decomposition temperature of the forming agent), print a sharp and random concave-convex pattern (5) as indicated in figure 3 on the convex part (5) using the clearance emboss method with a cold emboss roll that a random concave-convex pattern is carved on the surface. Also, more attractive products can be produced by printing a pattern (4) on the surface of the above synthetic resin layer (2) or the convex part of the repeating concave-convex pattern on the forming layer (2) using the ordinary paint used before the forming process or before pressing process after the forming process. Though it is not indicated in the figures, this invention can also achieve higher pollution resistance and matte effect by forming a surface treatment layer on the synthetic resin forming layer.

[Example 1]

After applying the combination A paint (below) with a forming agent on combustion resistant wall paper for lining (by Kyosin, Inc. WK-70NTP) using commacoater making about 0.2mm thickness, form colored synthetic resin layer with a forming agent by heating it for about 2 minutes at 140 degree Celsius that is below the decomposition point of the forming agent using a hot blast stove causing jell dry reaction. After printing on the surface a cross-striped pattern by photogravure method using color ink with the combination B forming control agent, hot-air dry for about 40 seconds at 110 degree Celsius, print a different cross-striped pattern by photogravure method using the same ordinary photogravure ink and dry the same way described above. Then heat it for about 60 seconds at about 220 degree Celsius in a forming furnace. This forms a synthetic resin layer by decomposing the forming agent, at the same time a tile-like shape with a concave and color cross-striped pattern by

controlling the forming at the printing part with the forming control agent. Then re-heat the surface of the formed shape at the temperature below the forming point using a infrared heater, apply a mold pressing process to the convex part of the tile-like shape by clearance emboss processing method using a cold emboss roll with a 1.5mm random pattern. This produces a forming decoration material for interior construction that combines a cross-striped repeating pattern on the concave part and a stone-like sharp and a random concave-convex pattern on the convex part with superior three-dimensional feel.

Combination A

Vinyl chloride resin (p-900 resin for paste)		100 weight parts
DOP	50	
TCP	15	
Ba-Zn stabilizer		3
Forming agent (ADCA)		6
Filler (CaCO3)	50	
Titanium raw material		15

Combination B

Vinyl chloride – acetic acid vinyl copolymer resin		20
Methyl-ethyl ceton	90	
Methyl-isobutil ceton	30	
Anhydrous merit acid (forming control agent)		30
Bengala pigments		10
ß yellow pigments	30	
Carbon black		2

[Example 2]

After coating a paint commonly used for vinyl chloride and forming a joining

layer on the polyester layer on the polyester resin 90g/m2, layer a forming agent containing composite indicated in the combination C using the Calendar method to make the sheet thickness to be about 0.18mm. Then print a repeating flower pattern with a color ink mixed with a bridging agent indicated in the combination D on the layer surface using the same method in the Example 1, after which heat-form it for 90seconds at about 210 degree Celsius in the forming furnace. This produces a concave-convex forming shape with 0.9mm thickness at the convex part of the pattern, about 0.4mm concave part. Then print a concave-convex pattern with a random cloth-like texture with a cold emboss roll (thickness of about 0.8mm) using the clearance emboss method used in the Example 1. This produces a forming decoration material for car interior that has a flower concave-convex pattern and a cloth-like pattern on the convex part similar to the one described in the Example 1.

Combination C

PVC (p-1100 straight resin)	100 weight parts
DOP	45
TCP	15
Ba-Ca-Zn stabilizer	3
Forming agent (ADCA)	3
Filler (CaCO3)	20
Titanium pigments	10

Combination D

Vinyl chloride – acetic acid vinyl copolymer resin	20
Methyl-ethyl ceton	120
Toreen	40
Toreagin-tiol DB (bridging agent by Sankyu Chemical)	25
Bengala pigments	15
Titanium yellow pigments	25

Carbon black 2

[Conclusion]

As it has become clear, this invention enables to produce forming interior decoration materials with a complex concave-convex and three-dimensional pattern that was not possible to produce in the past by using the mechanical emboss method with a random pattern carved on the convex part emboss roll, and the chemical emboss method to print a repeating concave-convex pattern with a paint mixed with forming control agent or a bridging agent on the layer. Also by using the chemical emboss method, it becomes possible to eliminate the needs for expensive emboss rolls for each pattern, and to produce inexpensively many different repeating patterns. It is also possible to produce forming interior decoration materials with even more complex and three-dimensional by combining patterns with random patterns.

4. Explanation of the figures.

Figure 1: cross section before forming

Figure 2: cross section after forming

Figure 3: cross section with emboss print

1: base material

2: synthetic resin layer before forming

2′: forming layer

3: painting pattern with a forming control agent or a bridging agent

4: ordinary printing pattern

5: convex part without repeating pattern

5′: random concave-convex pattern

6: concave part with repeating pattern

Patent applicant: Kyowa Leather, Inc.

Proxy: Rikichi Ichikawa

Revision (voluntary)

December 4, 1987

To Mr. Kunio Ogawa, director

1. File number - patent application 267711/Showa62
2. Name of invention - Manufacturing Method of Forming Decoration Material
3. Name of applicant – Kyowa Leather, Inc.
4. Proxy: Rikichi Ichikawa, patent agent, Katakura Bldg 8719, 3-1-2 Chuo-ku Kyobashi, Tokyo
5. Points of Revision – "Scope of Patent Application" and "Detained Explanation of the Invention"
6. Contents of Revision
   1. Change "Scope of Patent Application" to the attached description 1.
   2. Page 3 paragraph 11, *(note: linguistic typo)
   3. Page 3 paragraph 13, *(note: linguistic typo)
   4. Page 5 last paragraph, *(note: linguistic typo)
   5. Page 6 paragraph 3, change "0.25mm" to "0.3mm"
   6. Page 7 last paragraph-page 8 paragraph 1, *(note: linguistic typo)
   7. Page 8 paragraph 8-9, *(note: linguistic typo)
   8. Page 16, change "Combination B" to the attached description 2.

End of revision

[Attached description 1]

Scope of Patent Application

*(note: linguistic typo)

[Attached description 2]

Combination B

*(Note: linguistic typo)

Japanese Patent Office

Publication of Unexamined Patent Application

Kokai number Hei 1 (1989) 110123

Date of Publication of Unexamined Patent Application: April 26, 1989

Int. Cl.	Identification Code	Internal File No.	FI
B 29 C 59/04		Z-7639-4F	
59/00		A-7639-4F	
69/00		6363-4F	
B 32 B 5/18		7016-4F	
33/00		6122-4F	
C 08 J 9/06		8517-4F	

Request for Examination: Not yet made
Number of Inventions: 1
Total Pages: 7

Title: Production of Foamed Decorative Material

Application Number: Application Number Sho 62 (1987) 267711

Filing Date: October 23, 1987

Inventor: OKISHIO, Yukio
c/o Kyowa Leather KK
Higashi-cho 1876 banchi, Hamamatsu-shi, Shizuoka

Applicant: Kyowa Leather KK
Higashi-cho 1876 banchi, Hamamatsu-shi, Shizuoka

Agent: Patent Attorney ICHIKAWA, Rikichi

Specification

1. Title of the Invention

Production of Foamed Decorative Material

2. Claim

Production of a foamed decorative material comprising the steps of:

laminating a synthetic resin layer containing a foaming agent onto a base material, applying repeated print patterns of coating containing a foam controlling agent or crosslinking agent on the synthetic resin layer, heating the resin layer into a foamed layer having recessed and protruding patterns, re-heating the foamed layer at a temperature equal to or lower than the foaming temperature in the previous step and embossing the foamed layer with a cold embossing roll to form sharp and embossed random patterns at the protruding surfaces thereof.

3. Detailed Description of the Invention

[Industrial Applications]

The present invention relates to the production of internal foamed decorative material with excellent designs having complex and highly stereoscopic embossed patterns by forming recessed patterns of repeat patterns on a foamed layer and also forming sharp embossed patterns at the protruding surfaces thereof.

[Prior Art]

As internal automotive trim and architectural trim have recently been required to be more luxurious, the demand for more complex patterns has gradually increased. As part of the solutions, requests have been made to develop highly decorative internal decorative materials with complex and stereoscopic patterns by forming recessed parts of repeat patterns on a synthetic resin foamed material laminated on a base material and also by adding random sharp embossed patterns at the protruding parts thereof.

As for conventional productions of internal decorative materials having such patterns, the known methods are: (1) a so-called secondary embossing method of heating and foaming a synthetic resin layer containing a foaming agent, immediately forming random uneven embossed patterns with a cold embossing roll on the surface thereof, and then heating and adding recessed patterns with a cold embossing roll having repeat patterns thereto, or (2) a chemical embossing method of printing patterns corresponding to the above-noted recessed and protruding parts by applying coating material containing a foaming inhibitor or crosslinking agent on a synthetic resin layer containing a foaming agent, and then heating and foaming to form patterns corresponding to the embossed patterns mentioned above.

[Problems Overcome by the Invention]

However, in method (1) mentioned above, the primarily embossed patterns are deformed by heating during the secondary embossing process; also, the foamed layer mentioned above is heated twice due to the primary and secondary embossing, resulting in undesirable deformation and heat deterioration such as setting, cell deterioration, etc. of the foamed layer itself by the repeated heating.

Moreover, the method has various problems in that two expensive embossing rolls are needed and the method is costly and uneconomical, and the rolls should have a substantial pattern depth due to the above-noted reasons and it is difficult to add embossed patterns at a constant depth and shape. Also, in method (2), the above-noted problems in method (1) may be avoided; however, it is difficult to permeate the inhibitor or crosslinking agent only to parts lower than the printed surface and the agent is likely to permeate around the periphery thereof, so that the patterns will have unclear unevenness, and temperature and time control will be difficult during the foaming process for forming the embossed patterns. As a result, the method has the problem in that it cannot form patterns with clear, significantly uneven and delicate patterns.

After extensive research to solve the above-mentioned conventional problems, the present invention presents a production of foamed decorative material having recessed parts of repeat patterns and also sharp and complex random patterns at the protruding surfaces noted above by combining both a chemical embossing method and a mechanical embossing method.

[Problem Resolution Means]

The present invention is the production of a foamed decorative material comprising the steps of: laminating a synthetic resin layer containing a foaming agent onto a base material, applying repeated print patterns of coating containing a foaming inhibitor or crosslinking agent on the synthetic resin layer, heating the resin layer into a foamed layer having recessed and protruding patterns, re-heating the foamed layer at a temperature equal to or lower than the foaming temperature in the previous step and embossing the foamed layer with a cold embossing roll to form sharp and embossed random patterns at the protruding surfaces thereof.

[Operation]

The production of the present invention is explained in detail below.

In the present invention, a synthetic resin layer containing a foaming agent is first formed on a base material. As the method thereof, the layer is laminated at a sheet thickness of 0.05mm to 0.3mm, or preferably 0.10mm to 0.25mm, at the decomposition temperature of the foaming agent thereof or below by any of a calendering method, a coating method and an extruding method. This is because a sheet thickness less than 0.05mm is too thin when the sheet is heated to form a foamed layer and to add the above-mentioned embossed patterns, so that adding embossed patterns as the object of the invention may not be achieved. Also, if the sheet thickness is more than 0.25mm, the embossed patterns mentioned above will be satisfactorily formed but the sheet will be so heavy that there will be problems with application as internal decorative material. Particularly, when the sheet is used as internal decorative material for walls, it cannot pass the

weight regulation under the anti-combustion standard applicable to such materials and the production cost will be high, which is not preferable.

Moreover, the above-noted base material used in the present invention is generally paper, paper used for internal automotive trim, fire retardant paper, knit, woven fabric, unwoven fabric, glass cloth, plastic sheet, etc. by itself or the laminate of at least two materials thereof. Also, synthetic resin used for the synthetic resin layer containing a foaming agent and laminated on the base material is, in addition to vinyl chloride homopolymer, copolymer of vinyl chloride and polyvinyl acetate, polyethylene, polyurethane, etc. or the blend of vinyl chloride hompolymer and the materials thereof; and a foaming agent that is an ordinary heat decomposable foaming agent such as azodicarbonamide, p,p'-oxybisbenzene sulphonyl hydrazide, azobisisobutyronitrile, etc. and plasticizer, stabilizer, lubricant, chelate, filler, coloring agent, etc. are mixed thereto. Then, the above-mentioned laminated sheet is formed with repeated printed patterns of a colored or uncolored coating material containing a foaming inhibitor or crosslinking agent on its surface. As the printed patterns mentioned above, any patterns may be used as long as they are repeated patterns, and highly decorative patterns such as checked patterns, flower patterns, and geometrical patterns may be optionally selected.

As the resin used for the coating material, vinyl chloride, or copolymer of vinyl chloride and vinyl acetate, acrylic resin, polyurethane, cellulose acetate, etc. are used. As solvent, ketone such as methyl ethyl ketone, cyclohexanone, methyl isobuthyl kento, etc., aromatic hydrocarbon such as xylene and toluene, chlorinated hydrocarbon such as ethylene dichloride, methylene chloride, etc. are appropriately chosen depending on the resin in use and are mixed thereto. If the coating material is coloring material, highly weather- and heat-resistant pigment is selected, adding the properties noted above and durability to products. As a foaming inhibitor mixed into the coating material, besozotriazole, organic acid (e.g. maleic acid, fumaric acid, adipic acid), halogenated organic acid (e.g. gallephthaloyl (?) chloride, tetrachlorophthallic acid) or organic acid anhydride (e.g. maleic anhydride, trimellitic nhydride), etc. may be used; however, it is particularly

preferable to use benzotriazole or trimellitic anhydride. As a crosslinking agent mixed into the coating material, dithiol-S-triazine derivative (S-triazine derivative of, for example, 2-dibutylamino, 2-dimethylamino, 2-octylamino-, etc.) is applied, and 2-dibuthylamino-S-triazine derivative is particularly preferable in the present invention. The mixed amount of the above-mentioned foaming inhibitor or crosslinking agent in the coating material is 2 wt. % to 30 wt. %, preferably 5 wt. % to 20 wt. %, relative to the total weight of the coating material. When the mixed amount of the foaming inhibitor or crosslinking agent is less than 2 wt. %, foam inhibiting or crosslinking effects during the foaming process of the laminated sheet layer will be incomplete at the printed pattern surfaces of the coating material and sufficiently recessed parts of repeat patterns, as the object of the present invention, cannot be formed. Also, when mixed at more than 30 wt. %, the above-mentioned foam inhibiting or crosslinking effects will not improve. Moreover, in the present invention, a general coloring coating material of the above-noted composition with no mixture of the foaming inhibitor or crosslinking agent mentioned above is used to further apply different colored patterns from the above patterns on the laminated sheet, thus providing further complex and highly decorative products. The latter printed patterns may be formed after the formation of the foamed layer as the later process of the laminated sheet. As the method of forming the above printed patterns, the generally known gravure method, rotary screen printing method, flexographic method, or the like is used.

Continuously, after the layer is heated and dried at the temperature equal to or lower than the decomposition temperature of the foaming agent, the synthetic resin layer is heated and foamed in a heating furnace; at the same time, a coating material with the blend of a foaming inhibitor or crosslinking agent is used for suppressing the foaming of the printed patterns to form an embossed foamed layer having recessed repeat patterns.

In forming the layer, it is necessary to foam the foaming parts - in other words, protruding parts - by two to eight times. When the foaming is carried out by less than two times (0.1mm to 0.6mm in foamed sheet thickness), the foamed layer will be so thin that the above-noted process of

forming recessed patterns of repeat patterns and the following process of forming randomly embossed uneven patterns at the protruding surfaces of the foamed layer with a cold embossing roll cannot form sharp and stereoscopic patterns, which is not preferable.

Then, after uneven patterns of repeat patterns are added to the above-noted foamed layer by a chemical embossing method, the layer is re-heated at a temperature equal to or lower than the foaming temperature (lower than the decomposition temperature of the foaming agent therein) and a cold embossing roll having uneven patterns is used so as to form random sharp uneven patterns at protruding parts of the uneven patterns mentioned above.

In this case, it is preferable to use a roll having about 0.8mm to 2.0mm in depth of unevenness for the layer foamed almost eight times and the roll having 0.3mm to 0.8mm in depth of unevenness for the layer which is lightly foamed about two times so as to add patterns by a clearance embossing method. This is because random sharp and stereoscopic uneven patterns should be added without crushing the foamed cell structures at the protruding parts of the above-noted foamed layer with pressure. Moreover, in the present invention, if necessary, a surface treated layer is formed on the above-noted foamed layer before or after the foaming process by using a finishing agent consisting of generally known polyvinyl chloride resins, acrylic resins, urethane resins or others alone, or the copolymer thereof, or the blend thereof. By doing so, effects such as anti-contamination and matting may be added.

[Examples]

FIG. 1 shows a condition of one example of the present invention before foaming where a synthetic resin layer 2 containing a foaming agent is laminated on a base material 1 and colored or uncolored printed patterns 3 of repeat patterns containing a foam inhibitor or crosslinking agent is then formed on the layer surface.

Sequentially, a foamed layer 2' having uneven patterns of repeat patterns is formed by a so-called chemical embossing method wherein the synthetic resin layer 2 containing the above-noted foaming agent is heated and foamed, the foaming of printed patterns 3 is suppressed to form the recessed parts 6 of repeat patterns as shown in FIG. 2, and parts 5 having no printed patterns of repeat patterns are foamed to bring the same to protruding parts. Continuously, the foamed layer is re-heated at a temperature equal to or lower than the foaming temperature (decomposition temperature of the foaming agent therein) in the previous process, and sharp random uneven patterns 5' as shown in FIG. 3 are formed at the above-noted protruding parts 5 by a clearance embossing method with a cold embossing roll carved with random uneven patterns thereon. Moreover, in the present invention, a general printing coating material may be used before the above-noted foaming process or before an embossing process after the foaming process to add the printed patterns 4 at the protruding surfaces 5 of repeated uneven patterns of the synthetic resin layer 2 or the foaming layer 2' mentioned above, thus providing products with enhanced designs. Also, although not shown in each figure, an anti-contamination and matting effects may be also added to the present invention by forming a generally known surface treated layer on the synthetic resin foamed layer depending on the situation.

[Example 1]

A tile-like foamed material having recessed and colored checked patterns was provided by the steps of: over combustion paper for wall paper lining (WK-70NTP manufactured by Kojin Co., Ltd., coating a coating material of the blend A mentioned below, containing a foaming agent, at a thickness of about 0.2mm by a comma coater; then, heating it for about two minutes at about 140°C, which is lower than the decomposition temperature of the above foaming agent in a hot-air drying furnace, thus drying it into a gel condition and forming a colored synthetic resin layer containing the foaming agent; over the surface thereof, applying coloring ink containing a foaming inhibitor of the blending B mentioned below to add printed patterns of checked repeat patterns by a gravure method and then drying with hot air for about 40 seconds at about 110° C; by using

general gravure ink, similarly adding checked patterns of different repeat patterns from the above-noted printed patterns by a gravure method and drying as the above-mentioned printed patterns; and then, heating for about 60 seconds at about 220° C in a foaming furnace, thus decomposing the foaming agent therein and foaming the above synthetic resin layer, and at the same time, suppressing the foaming of the printed surfaces containing the above-noted foaming inhibitor. Sequentially, the surface of the foamed material was re-heated at the temperature equal to or lower than the above-noted foaming temperature by a far infrared radiation heater, and the protruding surfaces of the tile-like foamed material mentioned above were embossed by a clearance embossing method with a cold embossing roll carved with grain-like random patterns at about 1.5mm deep, thereby providing a foamed decorative material for building materials of an excellent design with the combination of recessed patterns of checked repeat patterns and grain-like sharp random uneven patterns at the protruding surfaces, and which is also clearly stereoscopic.

Blend A

Vinyl chloride resin (P = 900 paste resin)	100wt. %
DOP	50wt. %
TCP	15wt. %
Ba-Zn stabilizer	3wt. %
Foaming agent (ADCA)	6wt. %
Filler ($CaCo_2$)	50w. %
Titanium pigment	15wt. %

Blend B

Vinyl chloride-vinyl acetate copolymer resin	20wt. %
Methyl ethyl ketone	90wt. %
Methyl isobutyl ketone	30wt. %
Mellitic anhydride (foaming inhibitor)	30wt. %
Red iron oxide pigment	10wt. %
Titanium yellow pigment	30wt. %
Carbon black	2wt. %

[Example 2]

An embossed foamed material having 0.9mm thick protruding surfaces of patterns and about 0.4mm thick recessed surfaces, was provided by the steps of: forming a jointing layer by coating a (illegible –shimohiki?) coating material used for general vinyl chloride laser on a polyester unwoven cloth of 90g/m^2 METSUKE as a base material; laminating a composite containing a foaming agent containing the blend C shown below at about 0.18mm sheet thickness by a calendering method; then, forming flower patterns of repeat patterns on the layer by using coloring ink containing a crosslinking agent of the blend D mentioned below in the same method as in Example 1; and heating for 90 seconds at about 210°C in a foaming furnace for foaming. Then, uneven patterns were added thereto with a cold embossing roll where random cloth-like patterns were engraved at the depth of about 0.8mm, by the same clearance embossing method as in Example 1, thus providing a foamed decorative material for automotive trim which has uneven flower patterns and the same clear uneven patterns as in Example 1 with cloth patterns at the protruding surfaces of the flower patterns.

Blend C

PVC (P = 1100 straight resin)	100wt. %
DOP	45wt. %
TCP	15wt. %
Ba-Zn stabilizer	3wt. %
Foaming agent (ADCA)	3wt. %
Filler ($CaCo_2$)	20w. %
Titanium pigment	10wt. %

Blend D

Vinyl chloride-vinyl acetate copolymer resin	20wt. %
Methyl ethyl ketone	120wt. %
Toluene	40wt. %
Triazine-thiol DB	25wt. %
(manufactured by Sankyokasei Corp., crosslinking agent)	
Red iron oxide	15wt. %
Titanium yellow pigment	25wt. %
Carbon black	2wt. %

[Effects]

As described above, in the present invention, a synthetic resin layer containing a foaming agent is laminated on a base material; uneven patterns of repeat patterns are formed on the layer in a so-called chemical embossing method by using a coating material containing a foam inhibitor or crosslinking agent; and sharp uneven patterns are formed at protruding surfaces by a so-called mechanical embossing method with an embossing roll carved with random patterns. Thus, not only can the present invention produce internal foamed decorative materials having highly stereoscopic and complex patterns with excellent designs, but also can produce the materials economically by optionally selecting various patterns of repeat patterns. Furthermore, the present invention can provide internal foamed decorative materials which have uneven and highly stereoscopic patterns with the combination of the above-noted patterns and a small number of the latter random patterns.

4. Brief Explanation of the Drawings

FIG. 1 is a cross-sectional view of an example of the present invention before foaming.

FIG. 2 is the cross-sectional view after the foaming.

FIG. 3 is the cross-sectional view of FIG. 2 added with embossed patterns.

1: base material; 2: synthetic resin layer before foaming; 2': foamed layer; 3: printed patterns containing a foaming agent or crosslinking agent; 4: printed patterns by a normal method; 5: protruding parts having no printed pattern of repeat patterns; 5': random embossed patterns; 6: recessed parts of repeat patterns.

Patent Applicant: Kyowa Leather KK
Agent: ICHIKAWA, Rikichi

Written Amendment (voluntary)

December 4, 1987 (Sho 62)

To: the Commissioner of the Japanese Patent Office, Kunio OGAWA

1. Disclosure of a Case

Japanese Patent Application Sho 62 (1987) - 267711

2. Title of the Invention

Production of Foamed Decorative Material

3. Party Requesting Amendment

Patent Applicant

Kyowa Leather KK

4. Agent

Katakura Building, 1-2, Kyobashi 3-chome, Chuo-ku, Tokyo

(6179) Patent Attorney: Rikichi ICHIKAWA

5. Objects of Amendment: "Claim" and "Detailed Description of the Invention" in the specification

6. Contents of Amendment

(1) The "Claim" in the specification is amended as in "Attachment 1".

(2) "Kurikae kanetsu" on line 11 on page 3 of the same specification is amended to "kurikaeshi kanetsu".

(3) "Okoshi" on line 13 on page 3 of the same specification is amended to "okoshi".

(4) "Kanetsushi" on the last line on page 5 of the same specification is amended to "kanetsushite".

(5) "0.25mm" on line 3 on page 6 of the same specification is amended to "0.3mm".

(6) "Methyl isobutyl kent, etc." on the last line on page 7 to line 1 on page 8 of the same specification is amended to "methyl isobutyl ketone".

(7) "Besozotriazol" on line 8 to line 9 on page 8 of the same specification is amended to "benzotriazol".

(8) The table of "Blend B" on page 16 of the same specification is amended as in "Attachment 2".

[Attachment 1]

Claim

Production of a foamed decorative material comprising the steps of:

laminating a synthetic resin layer containing a foaming agent onto a base material, applying repeated print patterns of coating containing a foaming inhibitor or crosslinking agent on the synthetic resin layer, heating the resin layer into a foamed layer having recessed and protruding patterns, re-heating the foamed layer at a temperature equal to or lower than the foaming temperature in the previous step and embossing the foamed layer with a cold embossing roll to form sharp and embossed random patterns at the protruding surfaces thereof.

[Attachment 2]

Blend B

Vinyl chloride-vinyl acetate copolymer resin	20wt. %
Methyl ethyl ketone	90wt. %
Methyl isobutyl ketone	30wt. %
Trimellitic anhydride (foaming inhibitor)	30wt. %
Red iron oxide pigment	10wt. %
Titanium yellow pigment	30wt. %
Carbon black	2wt. %